

thirty-two hours, shows the general average percentage of verifications to be 74.42.* The percentages for the different elements are: Weather, 75.67;* wind, 64.10;* temperature, 75.41.* By states, etc., the percentages are: For Maine, 70.67; New Hampshire, 70.31; Vermont, 67.86; Massachusetts, 71.40; Rhode Island, 78.57; Connecticut, 76.10; eastern New York, 71.63; western New York, 71.02; eastern Pennsylvania, 73.98; western Pennsylvania, 74.62; New Jersey, 77.03; Delaware, 75.62; Maryland, 76.88; District of Columbia, 77.50; Virginia, 79.51; North Carolina, 75.96; South Carolina, 75.70; Georgia, 77.50; eastern Florida, 75.06; western Florida, 83.60; Alabama, 76.79; Mississippi, 72.38; Louisiana, 72.79; eastern Texas, 80.62; Arkansas, 69.69; Tennessee, 70.67; Kentucky, 77.99; Ohio, 76.92; West Virginia, 78.93; Indiana, 77.63; Illinois, 74.29; lower Michigan, 72.19; upper Michigan, 63.21; Wisconsin, 74.87; Minnesota, 70.85; Iowa, 77.05; Kansas, 70.45; Nebraska, 71.64; Missouri, 71.52; Colorado, 76.77; eastern Dakota, 66.53; Washington Territory, 70.94; Oregon, 76.43; northern California, 85.18; southern California, 90.05.

There was one omission to predict, out of 8,352, or 0.01 per cent. Of the 8,351 predictions that have been made, seven hundred and thirty-three, or 8.78 per cent., are considered to have entirely failed; six hundred and five, or 7.24 per cent., were one-fourth verified; 1,580, or 18.92 per cent., were one-half verified; 1,537, or 18.40 per cent., were three-fourths verified; 3,896, or 46.66 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

Of the total number of signals ordered during June, 1887, it was practicable to determine the justification or failure of sixteen; of these, eleven, or 68.75 per cent., were fully justified

* In determining the general average percentage and the percentages for the different elements, the Pacific coast states have not been included.

both as to direction and velocity. But one on-shore signal was ordered and this was not justified; for northeasterly winds eight signals were ordered, all of which were justified; seven signals were ordered without regard to direction, and of these, three, or 42.86 per cent., were justified. No signals were ordered late.

In addition to the above, there were ordered at display stations three signals, the justification of which it was impracticable to determine.

LOCAL VERIFICATIONS.

The following is from the report of the "Michigan State Weather Service" for June, 1887:

The percentage of verification of weather and temperature signals for the month is as follows: temperature, 87.2; weather, 83.0; temperature and weather, 85.1.

The railway weather signals were verified as follows: Detroit, Grand Haven, and Milwaukee Railway, 84.3; Chicago and Grand Trunk Railway, 83.7; Port Huron and Northwestern Railway, 84.6.

The following is from the June, 1887, report of the "Minnesota Weather Service:"

Verifications of weather signals for Minnesota were 79 per cent. for weather and 80 per cent. for temperature; for eastern Dakota, 78 per cent. for weather and 78 per cent. for temperature; for northern Iowa, 76 per cent. for weather and 89 per cent. for temperature.

The following is from the June, 1887, report of the "South Carolina Weather Service:"

The percentage of verification of the weather and temperature predictions for the whole state was: for weather, 81.6 per cent.; for temperature, 92.6 per cent.

The following is from the June, 1887, report of the "Tennessee State Board of Health Bulletin:"

The percentage of verification of the temperature and weather predictions during the month at Nashville and Clarksville were as follows: Nashville, temperature, 80.0 per cent.; weather, 73.3 per cent.; Clarksville, temperature, 100.0 per cent.; weather, 53.3 per cent.

STATE WEATHER SERVICES.

The following extracts are republished from the reports for June, 1887, of the directors of the various state weather services:

The "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

The average temperature for the month was about the normal, but a cool wave which passed over the state on the 14th did some little damage to the cotton plant in checking its growth and causing lice to attack the tender plant; no material damage, however, is reported from this cause.

The rainfall was well distributed over almost the entire state and has affected all crops, particularly corn, very favorably. All crops are reported as good and in better condition than for years.

Summary.

Mean temperature, 79°.8; highest temperature, 102°, at Fayette, Montgomery, and Mount Willing, on the 19th; lowest temperature, 48°, at Gadsden, on the 14th; range of temperature, 54°; greatest monthly range of temperature, 48°, at Gadsden and Mount Willing; least monthly range of temperature, 24°, at Tuscaloosa; mean daily range of temperature, 14°.3; greatest daily range of temperature, 43°, at Gadsden, on the 14th; least daily range of temperature, 0°, at Oswichee, on the 28th.

Mean depth of rainfall, 3.82 inches; mean daily rainfall, 0.127 inch; greatest depth of monthly rainfall, 8.91 inches, at Mobile; least depth of monthly rainfall, 1.28 inches, at Gadsden; greatest daily local rainfall 3.09 inches, at Mobile, on the 21st.

Average number of days on which rain fell, 8; average number of cloudy days, 8; average number of fair days, 14; average number of clear days, 8; warmest days, 18th and 19th; coldest days, 1st, 2d, and 14th.

The "Dakota Weather Service," under the direction of Mr. P. F. McClure, Commissioner of Immigration:

The normal temperature for the month of June in Dakota, as computed from the observations at stations of the United States Signal Service for seven years past, is 64°.7. The average daily temperature for June, 1887, has been warmer than usual, exceeding the normal by about 1°, and the average mean of the year 1886 by 4°, and the mean of 1885 by 5°.7.

The rainfall in Dakota during the month of June, covering a period of seven years from and including 1881, has averaged 3.42 inches. The present year we have had 3.23 inches, being 0.19 of an inch below the average, although but three of the years of the seven, viz., 1881, 1882, and 1885, have exceeded in the quantity of rainfall in June that of the season of 1887.

The "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, director:

The month of June, 1887, was notable for its high temperature, excess of sunshine, and great deficiency of precipitation.

A drought prevailed from the 9th to the end of the month, broken only by light local showers in the northern and central divisions from the 18th to 20th, and in the southern division on the 24th and 25th. Showers were frequent from the 1st to 9th, the amount of rainfall during that period being more than double that of the remainder of the month. The average deficiency was three inches for the state, and the greatest deficiency for any section was from four to five inches for De Kalb county.

The mean temperature of the month was three degrees above the June normal, and is the highest June mean temperature recorded in the past thirteen years. The maximum temperature, 104°.0, was reported from the northern and southern divisions on the same date, and is the highest June maximum temperature on record. A cool wave swept over the state on the 23d, the daily mean temperature falling gradually from 82°.0 on the 20th, to 63°.0 on the 23d, and then rose gradually to 79°.0 on the 30th. Light frosts were reported on the 23d-24th, in the lowlands of the northern counties, doing little, if any, damage to crops.

A severe local dust storm was reported from the north-central counties on the 18th, and a correspondent from Montgomery county reports a regular cloud-burst on the 16th that surpassed in violence anything of the kind that has heretofore occurred in that section.

The percentage of sunshine averaged 10 per cent. above the June normal.

The prevailing direction of the wind was from the southwest, and its maximum hourly velocity forty-eight miles, from the north, on the 9th. The average hourly movement of the wind was about seven miles per hour.

Temperature.—The mean temperature of the month for the state, 73°.4, was 3°.1 above the June normal for past thirteen years, and 1°.1 above the highest June temperature in the same period. The mean temperature of the northern division, 72°.0, was 3°.5 above the June normal for past ten years; of the central division, 73°.6, was 2°.1 above, and of the southern division, 74°.6, was 1°.8 above.

The month opened with a daily mean temperature of 60°.0 for the state, rising gradually to 76°.0 on the 4th, remaining in the seventies until the 16th, when it rose to 80°.0, remaining in the eighties for five days. A cool wave swept over the state at this period, causing a fall of 19°.0, the daily mean tem-

perature being 63°.0 on the 23d, when it again commenced to rise until it attained 79°.0 on the 30th. The extreme monthly mean temperatures reported were 67°.3 from Chicago, Cook Co., and 79°.2 from North Caledonia, Pulaski Co.

The maximum temperature reported during the month, 104°.0, was two degrees above the highest recorded in June for past ten years, and was reported from Oquawka, Henderson Co., and Benton, Franklin Co., on the 19th. The minimum temperature, 42°.0, was reported from Hennepin, Putnam Co., and Louisiana, Pike Co., Mo., on the 24th.

Precipitation (inches and hundredths).—The rainfall for the month was very light, the average for the state being 2.91 below the June normal for past ten years. Rain fell generally from 1st to 9th, but from the latter date to the end of the month there was a continued drought, broken only by light local showers in the northern division from 18th to 21st, and in the southern division on the 24-25th. More rain fell in the period from 1st to 9th than double that of the remainder of the month.

The average rainfall for the northern division, 1.61, was 2.78 below the June normal for past ten years; of the central division, 1.62, was 3.36 below, and of the southern division, 2.12, was 2.55 below. The averages for the three divisions and the state for the month are the lowest on record for June; that for the state being 1.34 below the lowest heretofore recorded (June, 1878). The average for the months April, May, and June, 1887, 7.23, is 4.93 below the ten-year normal for those months. The greatest monthly rainfall, 3.78, was reported from Albion, Edwards Co., and the least 0.00 (no rain) was reported from Decatur, Macon Co.

The "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

The temperature was considerably above the normal, while the range was comparatively small. The extreme for the state was from 39°.0, at Maury, on the 24th, to 98°.0, at Mount Vernon, on the 20th, so that the extreme monthly range occurred between the 20th and 24th.

Precipitation was greatly below the average, about three inches for the whole state, and varied very much in different parts of the state, from one-tenth of an inch at Princeton to 5.98 inches at Columbia City. Notwithstanding this deficiency in the rainfall, the harvest has not suffered materially, and bids fair to be an average one. If any important crop has suffered it is potatoes, which is reported a total failure in some localities.

Thunder-storms were few and not very violent, and nearly all occurred during the first week of the month, as did nearly all the rainfall, also.

The "Iowa Weather Service," Dr. Gustavus Hinrichs, Iowa City, director:

June, 1887, was very hot and rather dry, fair to fine weather, with southerly winds or calms, prevailing.

The mean temperature of the air was three and a half degrees above normal. During the past forty-eight years June has but once been as warm (1840) and twice only been warmer still by two degrees, namely, in 1865 and 1873. The number of hot days was ten, fully three times the normal number. The middle decade was the hottest, being about eight degrees above the normal; the first decade was five and a half degrees above, but the last decade was cool, being nearly three degrees below normal.

The cloudiness was about twenty per cent. less than normal, and clear days were two and a half times as numerous as cloudy days. The dryness of the air was greatest on the 17th, when the relative humidity at 2 p. m. came down to twenty-eight per cent.

The total run of the wind was light. Southerly winds and calms prevailed at fully three-fourths of all observations taken. No destructive storms occurred. The squall of the 18th extended over northern and eastern Iowa locally, with heavy rain, thunder, and lightning.

The total rainfall at the central station was less than two inches, being only forty per cent. of the normal amount. In the state the rainfall was less than two inches along the Mississippi and in a belt extending from Buchanan and Linn counties westward toward the middle of Iowa; it was also less than two inches in the northwest. But in the north, west, and south the rainfall generally exceeded three inches, and reached over six inches in Kossuth, Pottawattamie, and Union counties.

The greatest relief from the drought came by the extended rains of the 20th, 29th, and 30th. The rain frequency for the entire state has been quite large, rain having fallen on twenty days. But most of these rains were very local, and locally even light; the six days of more general rain named did more good than the other fourteen days with local rains. On account of the many showers rainbows were remarkably frequent. At the close of the month only the northeast of Iowa is seriously behind in rainfall, and the early July rains have made up for it already. It will be seen that our June rains this year did not fail us in Iowa, though in the east, parts of central Iowa, and especially in the northeast, they were deficient in amount. If the ground had not been so dry from spring and last summer our June rainfall this year would have been quite satisfactory. One stroke of lightning killed sixty-five head of sheep near South Amana on the 18th. A man each was killed by lightning in Adams and Madison counties on the 20th while plowing corn. Light frost was noted on the 21st in the northwest and northeast, heavier on the 23d in the same localities. Very fine crepuscular beams were seen at sunset in eastern Iowa on the 14th, which were mistaken by some for a form of northern lights.

The "Kansas Weather Service," Prof. J. T. Lovewell, Topeka, director:

June has been characterized by abundant rainfall, and by the rapid growth and maturing of all the crops. The weather has again been favorable to husbandry, and we may feel that Kansas has reason to rejoice in her prosperity.

Temperature.—In eastern Kansas the temperature has been about normal, but in the western part of the state the range has been lighter. The highest temperature reported was at Brookville, 109°, on the 20th. The lowest temperature was 44°, at Wilson, on the 1st. There was a period of high temperatures from the 11th to the 22d, and another hot wave prevailed in the last days of the month. The first week was the coolest period. It has not been too hot at any time for the active prosecution of all kinds of business.

Rainfall.—The rains prevailed generally throughout the state on the first three days of the month, also from the 8th to 12th, from the 23d to the 25th, and on the last three days. These rains have, in most cases, been accompanied by lightning and thunder. On the 24th, in the northeastern part of Montgomery county, a hail storm of considerable severity was reported, which destroyed crops so completely that farmers plowed up their grounds and replanted. No other destructive storm has been reported, which is a fact worthy of note in a month when tornadoes have been considered most likely to occur. We may further add that the rains fell for the most part in gentle showers and in a way to do the greatest benefit to the crops.

The dry part of the month, from the 12th to 24th, was favorable for securing the crops, and the wheat was all harvested in fine condition and is a fair crop. Oats were destroyed by chinch bugs, and have been harvested only for fodder in most cases. The corn has reached a high degree of maturity for the season, and seems now likely to make an extraordinary crop.

The previous deficiency of rain had rendered the ground very dry, and the rains of this month have been most timely to avert the failure to crops which must have resulted had the drought prevailed a few weeks longer.

The "Michigan Crop Report" (the state weather service is in charge of N. B. Conger, Sergeant, Signal Corps, at Lansing):

The temperature from the 1st to the 8th was slightly below the normal, and the precipitation was above the normal, with heavy rains on the 5th. From the 9th until the afternoon of the 17th the weather was hot and dry. Temperature recorded at many stations above 90° on the 17th. On the afternoon of the 17th a heavy thunder-storm occurred, accompanied by brisk winds. This storm was reported in twenty-two counties, and the time was recorded as from 3 p. m., the beginning, to 10.20 p. m., as the time of ending. Local showers occurred on the 18th, 20th, 21st, 22d, and 23d, and no rain is recorded as falling after that date, until the afternoon of the 30th. The temperature reached the minimum on the 24th to 26th throughout the state, and then began a steady rise which reached the maximum on the 28th, 106°.5, at Grayling, and continued high on the 29th and 30th. No rainfall is recorded in Allegan county after the 9th.

Temperature.—The mean temperature for June, 67°.5, is 4°.9 above the normal. The mean temperature for the Upper Peninsula is 61°.0; northern counties, 63°.2; central, 68°.8, and the southern, 69°.8. The mean temperature of the central and southern sections is 4°.4 above the normal.

The mean maximum temperature for the state is 91°.5; this is considerably above the normal, and the month is remarkable for the extremes of temperature. Highest temperature, 106°.5, at Grayling, 28th; lowest, 37°.0, at Charlevoix, 27th.

The mean of the minimum temperatures, 44°.9; mean range, 46°.6. The middle and latter part of the month record high temperatures. A cool wave passed over on the 24th to 26th, with light frost reported in Crawford county on the morning of the 26th.

Precipitation.—The mean rainfall for June, 2.67, is 1.13 inches below the normal. The mean rainfall, by sections, is as follows: Upper Peninsula, 2.72 inches, northern section, 2.86 inches; central section, 1.78 inches, and the southern section, 4.41 inches. It will be seen by these means that the heaviest rainfall was recorded in the southern counties, while the central counties received the lightest. The mean of the central and southern counties is 1.00 inch below the normal.

The southern section received a heavy rainfall from the 1st to the 5th. Adrian reports 3.05 inches on the 1st, and Buchanan reports a fall of 2.53 on the 4th. The heavy fall of rain on these days brings the precipitation of the southern counties up to the normal, while all other sections are below. The thunder-storm of the 17th was reported in twenty-two counties, from 3 p. m. to 10 p. m., and was preceded by high winds and some damage was reported. The rainfall from this storm was about the average, except in the southeastern part of the state, where heavy rain fell, and, with the brisk winds, "lodged" grain to some extent.

Winds.—The month has been remarkable for the absence of high or destructive winds. The mean total movement of the wind is 4,631 miles, or 154.4 miles per day. The maximum velocity of wind is reported at Mackinaw City, 47 miles, southeast, on the 17th. Local wind storms were reported at Hudson on the 8th and 20th, doing some damage to trees.

The "Minnesota Weather Service," Prof. Wm. W. Payne, Carleton College, Northfield, director:

The month was notable for an abnormally high temperature and deficiency of precipitation in the southern counties. The frost on the morning of the 23d did some little damage to tender vegetation. For the week ending June 4th the temperature and precipitation were deficient; for the second week there was an excess of temperature and a lack of precipitation; for the third week there was an excess of temperature and precipitation; from the 18th to the close of the month the weather did not vary much from the average, so that

the crops were generally in a favorable condition, except in southeastern Minnesota, where the prospects are poor, as the rainfall for May and June in this locality has been only fifty per cent. of the average for these months.

Temperature.—The mean for the state is $68^{\circ}.3$; this is $2^{\circ}.9$ above that of 1886 and $4^{\circ}.2$ above that of 1885. The mean has varied from $2^{\circ}.0$ above the normal in the southeastern counties and over $3^{\circ}.0$ above in the Red River Valley to nearly $8^{\circ}.0$ below the normal in the neighborhood of Duluth, at which place the mean temperature is the lowest noted since 1876. At La Crosse the mean is the highest observed for June in fourteen years. Two well-marked cool terms occurred; these were on the 4th and 5th, and from the 23d to the 25th. The minimum temperature for the month was registered during the former of these periods at Grand Forks and Pokegama Falls, where it was $32^{\circ}.0$. Frosts were reported during both of these terms as far south as the forty-third parallel. The warmer periods of the month were the 6th and 7th, 14th to 17th, 28th and 29th. The maxima temperatures, as in the month preceding, and with few exceptions, were recorded in the northwestern and north-central counties. The monthly range of temperature for the state, which is $64^{\circ}.0$, is not as great as for the corresponding month of either 1885 or 1886; this range is the same as reported from Grand Forks. The lowest monthly mean temperature is $55^{\circ}.4$, reported from Duluth; this is over $10^{\circ}.0$ below that for stations a few hundred miles distant, and seems to be due to the cooler and denser air moving from the lakes toward the land, where the temperature was higher and above the normal, and the atmosphere consequently lighter and more expanded.

Precipitation.—This was generally deficient, except in the lower portion of the Red River Valley, where there was a slight excess. The average for the state is 3.84 inches; this is .70 of an inch more than in 1886 and .69 less than in 1885. The heaviest precipitation was in the northern portion of the state, while heavy local showers brought the amounts above the average at a few southern stations; notably is this the case at Red Wing and Rochester, where the fall was over five inches. In the southeastern portion of the state the total rainfall was 3.3 inches below the average of the corresponding month for fifteen years. This deficiency, together with that of the month preceding, makes a total deficiency of six inches for the two months. At Duluth the precipitation was 2.5 inches below the average and Saint Paul 1.9 inches below. The dates of general precipitation were the 1st, 3d, 7th, 8th, 11th to 14th, 16th, 18th, 20th, 27th, 29th, and 30th. Stations reporting over an inch of rainfall, with the dates and amounts, were: Pine River Dam, 30th, 1.08; Grand Forks, 16th, 1.82; Albert Lea, 12th, 1.08; Red Wing, 14th, 3.60; Rochester, 14th, 2.42; Park Rapids, 11th, 1.43, and 16th, 1.80; Northfield, 14th, 1.60; Delano, 14th, 1.17; Litchfield, 11th, 2.20; Morris, 29th, 1.25; Saint Vincent, 16th, 1.72; Moorhead, 29th, 1.36; Duluth, 17th, 1.41; Leech Lake, 1.05 on 16th and 17th; Pokegama Falls, 11th, 1.11, and 16th, 1.28; Lake Winnibigoshish Dam, 17th, 1.08.

Winds.—The prevailing direction was from the southeast.

The "Mississippi Weather Service," Prof. R. B. Fulton, of the University of Mississippi, Oxford, director:

Summary.

Mean temperature, $79^{\circ}.0$; the highest observed was $105^{\circ}.0$, at Okolona and Columbus; the lowest, $52^{\circ}.0$, at Jackson, on the 15th, and Batesville on the 24th; absolute range, $53^{\circ}.0$.

Average depth of rainfall, 4.84 inches; greatest monthly rainfall, 8.22 inches, at Biloxi; least monthly rainfall, 1.20 inches, at Batesville.

The "Missouri Weather Service," Prof. Francis E. Nipher, of Washington University, Saint Louis, director:

The mean temperature for the past month has been $75^{\circ}.9$, which is $1^{\circ}.2$ above the normal at the central station. The highest temperature during the month, $95^{\circ}.8$, was observed on the 20th, and the lowest, $56^{\circ}.3$, on the 1st. The rainfall for the month was 2.29 inches, which is 3.19 inches below the average for Saint Louis. Rain fell on eight days during the month.

In the state the rainfall was heavy in the western and southwestern parts, while in the north and eastern parts along the Missouri and Mississippi rivers the fall was below the normal. The heaviest falls reported were: Houstonia, 10.07; Miami, 7.88; Sedalia, 7.83; Pleasant Hill, 6.55; Springfield, 6.32; Pro Tem, 6.07, and Leavenworth, 5.45 inches.

The highest temperatures in the state were 101° , at Pro Tem; 100° , at Miami and Louisiana; 99° , at Sedalia; 98° , at Troy, and 97° , at Mascoutah, Ill., and signal office at Saint Louis. The lowest temperatures were 40° , at Ironton; 42° , at Louisiana; 44° , at Steelville, and 48° , at Troy.

Observers report the crops in good condition generally. Wheat harvest about ended at the close of the month.

The "New Jersey Weather Service," Prof. George H. Cook, of the Agricultural College, New Brunswick, director:

The rainfall for June was far above the average and came in time to save most of the crops that suffered so much in May from drought. Ten stations—New York, Philadelphia, Atlantic City, Dover, Paterson, Newark, South Orange, Somerville, New Brunswick, and Moorestown—show an average excess of 3.05 inches.

Seventeen stations report rain to have fallen on an average of ten days out of the thirty.

Eleven stations report an average of nine days on which the cloudiness was equal or exceeded eight on a scale running from 0 to 10. Atlantic City, Philadelphia, South Orange, and Clayton enjoyed the most sunshine.

The mean temperature at eleven stations, as compared with normals determined from past records of New York City, Philadelphia, Atlantic City, Dover, Paterson, Newark, South Orange, Readington, Somerville, New Brunswick, and Moorestown, shows an excess of heat received during June of six-tenths of a degree.

The most destructive storm of the month, which occurred on the 22d, traversed the state in a northeasterly direction and was due to the presence of areas of low pressure on the lakes which moved slowly into Canada. We first hear of the damage done in Delaware before it reached us, and then of the havoc displayed in New York and New England after. New Jersey received its share. The downpours in some sections of the state were without comparison the heaviest recorded in years. In one day the rainfall at Lambertville measured 6.91 inches. The thunder was loud and the lightning terrific. Damage inflicted was considerable. At Plainfield the lightning struck the steeple of St. Mary's Roman Catholic Church, on Liberty street, and shattered one of the large side windows. Mr. V. W. Nash's residence was struck. A wire bird-cage was twisted into an unrecognizable shape. A large barn near New Market, belonging to Randolph Giles, was struck and nearly destroyed by fire. At Newark, large trees were torn asunder and the side of a new house on Sixteenth avenue was blown down. At Morristown a house on Water street was struck and set on fire, and considerable damage was done at the railroad station to the telegraph wires.

The "North Carolina Weather Service," Dr. Charles W. Dabney, jr., of Raleigh, director:

Summary.

Temperature (in degrees).—Mean for June, 1887, 73.8 ; normal for June, 74.6 ; departure from the normal, -0.8 ; highest, 102.0 , on the 20th, at Mount Pleasant, N. C.; lowest, 43.0 , on the 13th, at Marion, N. C.; absolute range, 59.0 ; mean daily range, 21.4 ; highest on record, 102.0 , occurred in 1874, at Norfolk, Va., and in 1887, at Mount Pleasant, N. C.; lowest on record, 43.0 , occurred in 1887, at Marion, N. C., as far as known; greatest daily range, 37.0 ; least daily range, 6.6 ; warmest day, 27.5 above the normal, on the 20th; coldest day, 31.5 below the normal, on the 18th.

Precipitation (inches and hundredths).—Average for June, 1887, 4.24 ; normal for June, 4.41 ; departure from the normal, -0.17 ; daily average, 0.14 ; greatest monthly rainfall, 9.74 , at Southport, N. C.; least monthly rainfall, 2.18 , at Chattanooga, Tenn.; greatest local daily rainfall, 2.87 , at Raleigh, N. C., on the 23d. Daily rainfalls (exceeding one inch): Raleigh, N. C., 2.87 ; Charlotte, N. C., 1.60 ; Wilmington, N. C., 1.78 ; Norfolk, Va., 1.12 ; Cape Henry, Va., 1.61 ; Knoxville, Tenn., 1.46 ; Southport, N. C., 2.06 ; Davidson College, N. C., 1.45 ; Salisbury, N. C., 1.70 ; Weldon, N. C., 2.07 ; Marion, N. C., 1.10 ; Mount Pleasant, N. C., 1.43 ; Lenoir, N. C., 2.40 .

Winds.—Prevailing direction for June, 1887, northeast; average direction for June, southwest; highest velocity, thirty miles, from the southwest, on the 1st, at Chattanooga, Tenn.

Weather.—Average number of clear days, 11.7 ; average number of fair days, 12.1 ; average number of cloudy days, 6.2 ; average number of rainy days, 9.1 .

Droughts.—Longest duration of: At Lenoir, N. C., from 7th to 19th, 13 days; at Reidsville, N. C., from 11th to 17th, 7 days; at Tarborough, N. C., from 12th to 21st, 10 days; at Marion, N. C., from 12th to 20th, 9 days; at Davidson College, N. C., from 11th to 20th, 10 days; at Salisbury, N. C., from 11th to 19th, 9 days; at Mount Pleasant, N. C., from 12th to 19th, 8 days; at Charlotte, N. C., from 24th to 30th, 7 days; at Southport, N. C., from 12th to 21st, 10 days; at Wilmington, N. C., from 12th to 21st, 10 days; at Raleigh, N. C., from 12th to 19th, 8 days; at Weldon, N. C., from 24th to 30th, 7 days; at Lynchburg, Va., from 12th to 19th, 8 days; at Norfolk, Va., from 24th to 30th, 7 days; at Cape Henry, Va., from 24th to 30th, 7 days; at Chattanooga, Tenn., from 12th to 20th, 9 days; at Knoxville, Tenn., from 9th to 20th, 12 days. Average number of days (longest duration of), 9.

Frost (light), 12th, 13th.

The "Ohio Meteorological Bureau," Prof. B. F. Thomas, of the Ohio State University, Columbus, president:

The weather for June was remarkable for the high barometric pressure prevailing, and for high temperature and clear skies. The mean barometric pressure was 29.990 inches, our highest June mean. The five-year average is 29.968 inches. The highest reading, 30.453, and the lowest, 29.620, were both the highest recorded for June. The barometric range, .833 inch, was less than for any preceding year, except 1886, indicating a uniformly high pressure throughout the month.

The mean temperature was $71^{\circ}.0$. The highest June mean for any preceding year was $67^{\circ}.5$, in 1886, while the five-year average is $63^{\circ}.3$. The June normal for the state is $70^{\circ}.36$. The mean temperature for the northern section was $69^{\circ}.3$; for the middle section, $70^{\circ}.5$, and for the southern section, $72^{\circ}.5$.

The highest point reached by the thermometer was $102^{\circ}.0$ on the 20th, at Pomeroy, our highest June reading. The lowest was $38^{\circ}.0$ on the 24th, at Paulding; this is $4^{\circ}.0$ higher than any preceding June minimum. Fourteen days were reported as clear, and six only as cloudy.

The mean rainfall, 3.85 inches, was slightly below the average, which is 4.19. The June normal is 4.02 inches. The greatest rainfall reported was 6.67 inches, at Hudson, and the least, 1.69, at Washington Court House. The greatest rainfall recorded during one day was 3.37 inches at Napoleon on the 1st. There were also four records of over two inches in one day, on the 4th, 5th, and 7th, apparently from local storms.

Two heavy rains crossed the state during the first week, and a third on the 8th and 9th ushered in a week of clear weather. The northern section had light rains on the 17th, 18th, 19th; and on the 20th another general storm occurred, giving a moderate rainfall from the 20th to the 23d, when the month was finished with fair weather.

Summary.

Mean temperature, 71°.0; highest temperature, 102°.0, on the 20th, at Pomeroy; lowest temperature, 38°.0, on the 24th, at Paulding; range of temperature, 64°.0; mean daily range of temperature, 22°.6; greatest daily range of temperature, 45°.0, on the 27th, at Paulding; least daily range of temperature, 2°.5, on the 10th, at Napoleon.

Average number of clear days, 14.0; average number of fair days, 10.0; average number of cloudy days, 6.0; average number of days on which rain fell, 9.7.

Greatest number of days on which rain fell, 15, at Cleveland; least number of days on which rain fell, 6, at North Lewisburg and Sydney.

Mean monthly rainfall, 3.85 inches; average daily rainfall, .128 inch; average monthly rainfall for northern section, 4.21 inches; average monthly rainfall for middle section, 3.92 inches; average monthly rainfall for southern section, 3.40 inches; greatest rainfall, 6.67 inches, at Hudson; least rainfall, 1.69 inches, at Washington Court House.

Prevailing direction of wind, southwest.

"Oregon Weather Service," report prepared by B. S. Pague, Private, Signal Corps:

Temperature.—The temperature was below the normal throughout the state, especially along the coast. A warm wave extended over the state on the 22d, except in the southeastern counties, where it was felt on the 22d. Ashland reports the highest temperature, 103°. It was generally cool during the first half of the month, the lowest reported was 24°, on the 5th, at Linkville.

Rainfall.—The rainfall has been below the average in all parts of the state, except in the northeastern counties where it was slightly above the average. The most marked departure was at Astoria, where it was 1.15 inches below the average, and at Bandon, where it was 1.01 below the average. The seasonal rainfall has been above the average along the coast and interior valleys, except in Portland, where it was nearly normal, and below the average in the southern part of the state. The greatest excess was at Astoria, where it amounted to 15.27 inches. The greatest deficiency was at Lakeview, where it amounted to 4.37 inches. Rain fell on ten days at Portland, and on a less number of days at the other stations, the least number of days being at Bandon, where it fell on only three days.

Weather.—No general storm appeared during the month; the rainfall was in showers, and the prevailing weather was clear.

Winds.—The winds were generally northerly, except at Astoria where they were southwesterly, and at Lakeview where they were southerly. They were generally fresh, rather above the average in force.

Lakeview reports frost on the 6th, snow (in small quantities) on the 5th and 11th, and a thunder-storm on the 22d.

The **"South Carolina Weather Service,"** Hon. A. P. Butler, Commissioner of Agriculture for South Carolina, director:

The noteworthy features of this month have been: 1st. The cool weather which occurred from the 12th to 14th. 2d. The unusually high temperature of the 19th and 20th; and 3d. The period of dry weather, which, with the exception of light local showers on the 10th and 11th, prevailed in all sections of the state from the 3d until the 20th.

A warm wave occupied the state on the 9th and 10th, and during those dates the maximum temperature at several stations reached or exceeded 100°. On the 9th the maxima were as follows: Chester, 103°; Blackville, 102°; Jacksonborough, 100°; Saint George's, 100°; Bennettsville, 99°; Brewer Mines, 98°. On the 10th they were: Saint Matthew's, 102°; Hampton, 101°; Jacksonborough, 100°; Saint George's, 100°; Winnsborough, 99°; Bennettsville, 99°; Chester, 99°; Allendale, 99°; Yemassee, 98°.

During the hot wave of the 18th to 20th the maximum temperature at many of the stations reached 100° on three successive days.

The mean temperature for the month has been, notwithstanding the high maxima for the three days referred to above, slightly below the normal. At Charleston the mean temperature was 77°.4, or about 2° below the mean for the last sixteen years. In the central and upper counties the difference is slight.

The rainfall has been less than the average in all sections of the state. At Charleston it was 4.54 inches, which is 1.12 inches less than the average rainfall for June, as determined from records of the past sixteen years.

The month as a whole has been favorable to farming operations. The absence of rain enabled farmers to harvest successfully the small grain crops. Corn began to suffer for rain, but the abundant and timely showers which occurred during the last decade of the month prevented any serious damage.

Summary.

Mean temperature, 77°.9; highest temperature, 107°, at Bennettsville and Hampton, on the 20th; lowest temperature, 44°, at Kingston, on the 13th; range of temperature, 63°; greatest daily range of temperature, 47°, at Spartanburg and Hampton, on the 14th; least daily range of temperature, 6°, at Brewer Mines, on the 11th, and at Charleston on the 26th.

Mean depth of rainfall, 3.53 inches; greatest monthly rainfall, 5.72 inches, at Newberry; least monthly rainfall, 1.13 inches, at Bennettsville; greatest daily rainfall, 3.12 inches, at Winnsborough, on the 23d; least daily rainfall, trace (amount inappreciable), at Charleston on the 2d, and at Columbia on the 19th, 21st, and 27th. Average number of rainy days, 8.1.

Copious rains occurred in the upper and middle counties on the 1st and 2d, and from the 20th to the 23d. In the lower counties the heaviest rains of the month occurred during the period from the 25th to 27th, inclusive.

The following is an extract from the report of the **"Meteorological Department of the State (Tennessee) Board of Health,"** prepared under direction of J. D. Plunkett, M. D., President of the State Board of Health, by H. C. Bate, Signal Corps, Assistant, Nashville:

The special meteorological features for the month of June were the high temperature about the 19th and 20th, the severe local hail storms, the abnormally small amount of precipitation, and the small percentage of cloudiness.

The mean temperature was 73°.4, the highest for the past five years, except in 1885, when it was 74°.6. The highest temperature reported was 100°.0 on the 19th and 20th, and was 2°.0 above the record of the five preceding years. The lowest was 45°.0, recorded on the 25th, although from most of the stations in the state the minimum was recorded on the 1st and 2d. This was the lowest reported during the past five years. It was reported from the Cumberland plateau, one of the most elevated stations in the state. The range of temperature was several degrees more than that previously reported.

The mean rainfall was 2.77 inches, by far the smallest amount for June in many years. It was about an inch and a half less than in 1885, and four and one-half inches less than the mean for June of last year, which was abnormally great. At many places in the state the rainfall was the least recorded in many years. At Memphis and Nashville it was the least June rainfall since the establishment of the Signal Service observations in 1871, and at Chattanooga it was the least since 1879. Of the amount the eastern division received an average of a little more than two and a half inches, the middle division about three inches, and the western division about two and a half inches. The rains were, for the most part, light and local in their character and badly distributed, only a few being general, notably those of the 1st, 3d, 6th, and 21st. During the first decade rains were frequent, but during the second decade there was scarcely any rain in the state, a few stations in the central part reporting light showers, and most of them inappreciable. The greatest rainfall was 5.30 inches, reported at Savannah, and the least was only 1.04 inches, reported at Memphis, about one hundred miles distant. The greatest local daily rainfall was 2.60 inches, reported on the 21st at Manchester. Perhaps the heaviest local rain of the month was at Lynnville, Giles Co., on the 19th. The days of the greatest rainfall were the 1st, 3d, 6th, and 21st, and of these the greatest was on the 1st. There were eight days on which no rain was reported in the state. While the drought during the second decade of the month was somewhat injurious to the growing crops, it was very favorable for the wheat and hay harvest, which progressed most favorably, and much was added to the yield, especially of the latter.

Summary.

Mean temperature, 73°.4; highest temperature, 100°.0, on the 19th, at Cookeville, and on the 20th, at Austin; lowest temperature, 45°, on the 26th, at Farmingdale; range of temperature, 55°.0; mean monthly range of temperature, 42°.5; greatest monthly range of temperature, 52°.0, at Hohenwald; least monthly range of temperature, 30°.0, at Covington; mean daily range of temperature, 18°.5; greatest daily range of temperature, 38°.0, on the 14th, at Farmingdale, and on the 20th, at Hohenwald; least daily range of temperature, 8°.0, on the 1st, at Florence Station; on the 3d, at Ashwood; on the 11th at Covington, and on the 28th, at Beech Grove; mean of maximum temperatures, 95°.8; mean of minimum temperatures, 53°.3.

Average number of clear days, 13.8; average number of fair days, 10.5; average number of cloudy days, 5.7; average number of days on which rain fell, 8.6.

Mean depth of rainfall, 2.77 inches; mean daily rainfall, 0.092 inch; greatest rainfall, 5.30 inches, at Savannah; least rainfall, 1.04 inches, at Memphis; greatest local daily rainfall, 2.60 inches, on the 21st, at Manchester.

Days of greatest rainfall, 1st, 3d, 6th, 21st; day of greatest rainfall, 1st; days without rainfall, 12th, 13th, 14th, 15th, 16th, 17th, 23d, 24th.

Warmest days, 19th, 20th; coldest days, 1st, 2d.

Prevailing winds, westerly.

NOTES AND EXTRACTS.

OCEAN FOG PREDICTIONS.

[By Sergeant E. B. GARRIOTT, Signal Corps.]

In articles in the MONTHLY WEATHER REVIEW relative to this subject it was shown that the fog of the Banks of Newfoundland was caused by warm air

from over the Gulf Stream blowing over the cold surface of the ice-fields and Arctic currents; it was also shown that the cyclonic areas which passed over and from the North American continent were the agents whereby the intermingling of these masses of warm and cold air was effected.